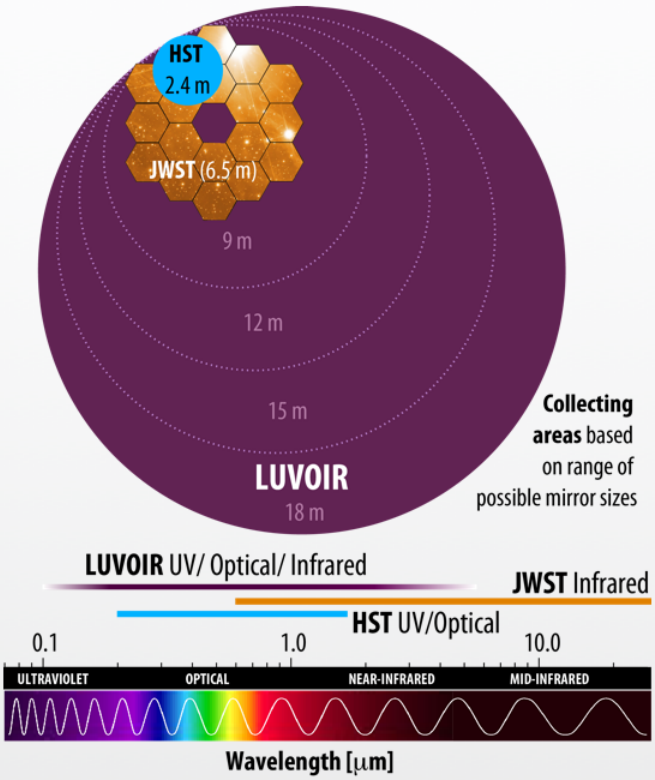
Large UltraViolet Optical and InfraRed surveyor (LUVOIR)

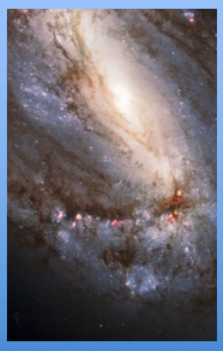
A transformative leap in sensitivity and resolution

A large-aperture UV-Optical-IR space observatory capable of achieving revolutionary science goals was highlighted in the NASA 2013 Astrophysics Roadmap "Enduring Quests, Daring Visions" and the recent AURA Report "From Cosmic Birth to Living Earths". Below some key scientific capabilities of a LUVOIR-class facility are summarized. The mission concept will be defined through a community-led study, culminating in a report to the Astro2020 Decadal Survey.



Astrophysics

LUVOIR's unprecedented resolution will resolve 1-parsec-sized star-forming regions of galaxies at distances up to 10-25 mega-parsecs, map the distribution of dark matter in the nearby universe, and isolate gravitational wave sources.



Exoplanets

LUVOIR will enable astronomers to detect biomarkers on distant Earth-like worlds, analyze the structure and composition of non-Earth-like planets, and image faint circumstellar disks where planets are forming.

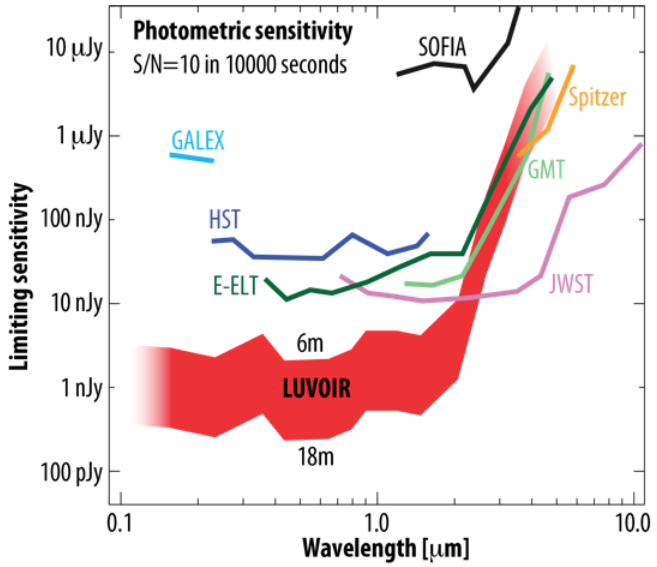
Cosmic Origins

LUVOIR will identify the first starlight in the early universe, uncover the archaeology of early galaxies, and find the first black holes.

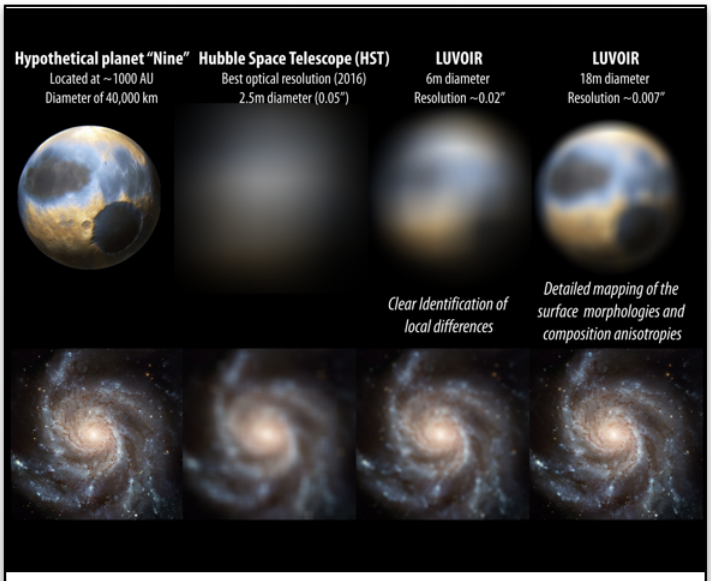
Solar System

LUVOIR will be able to resolve surface and cloud features as small as 50 km for outer planets and 200 km on Kuiper belt objects, and will image the icy plumes from giant planet moons.

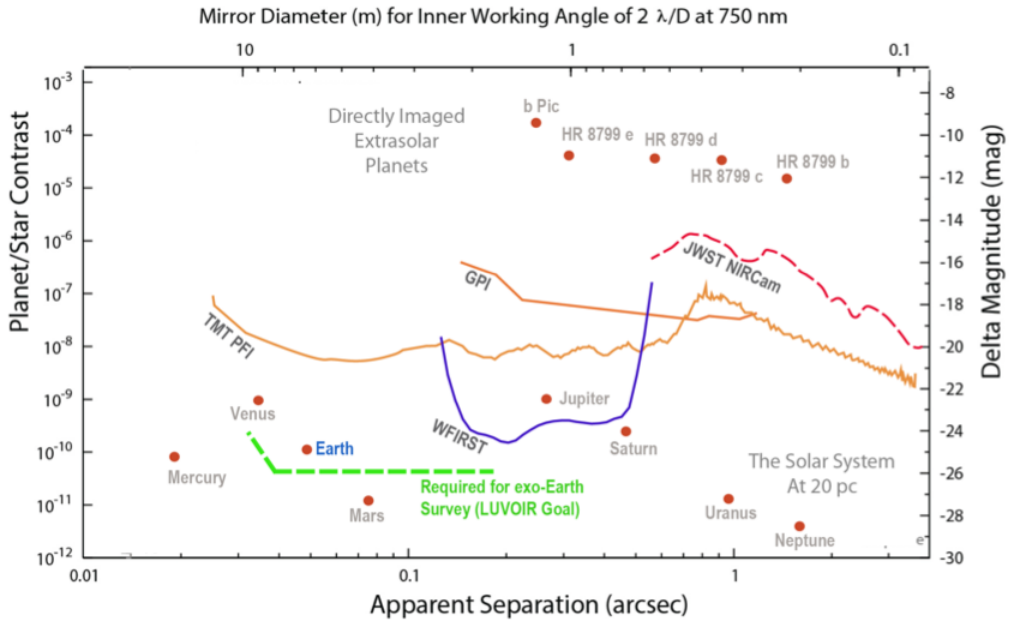
- An extraordinarily large mirror aperture (> 8 m) and exceptional wavefront stability will permit unprecedented spatial resolution and coronagraphy.
- Broad wavelength coverage from the UV and reaching into the near-infrared will permit revolutionary multi-wavelength studies.



Limiting sensitivities: for a variety of current and near-future facilities. LUVOIR values are computed assuming a 280K temperature and for a range of telescope diameters (based on Dalcanton et al., AURA report, 2015).



A telescope targeting the UV-Optical-IR with a large aperture mirror will provide unprecedented **spatial resolution**, and – as shown in the figure – allow us to map the surfaces of distant planets in the Solar System and galaxies at large distances.



High-Contrast Exoplanet Imaging: Shown are the contrast limits (S/N=5) after post-processing one hour's worth of data for various coronagraph instruments. In the lower part of the plot, values for Solar System bodies at 20 pc are shown for comparison to currently imaged extrasolar planets (top part of the planet). The region above the dashed green line would be probed by LUVOIR. Adapted from Lawson et al. (2012) and Mawet et al. (2012).

For additional information and news visit: http://asd.gsfc.nasa.gov/luvoir